

**DRAFT**

**ENVIRONMENTAL IMPACT STATEMENT FOR THE  
SOUTH POWDER RIVER BASIN COAL LEASE APPLICATIONS  
(FEDERAL COAL LEASE APPLICATION WYW 127221)**

Prepared for

**U.S. Department of the Interior  
Bureau of Land Management  
Casper Field Office  
Casper, Wyoming**

and

Cooperating Agency

**U.S. Office of Surface Mining  
Reclamation and Enforcement  
Denver, Colorado**

by

**WWC Engineering  
Sheridan, Wyoming**

January 2003

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	ES-1
1.0 INTRODUCTION .....	1-1
1.1 Purpose and Need for Action .....	1-14
1.2 Regulatory Authority and Responsibility .....	1-17
1.3 Relationship to BLM Policies, Plans, and Programs .....	1-19
1.4 Conformance with Existing Land Use Plans .....	1-20
1.5 Consultation and Coordination .....	1-24
2.0 PROPOSED ACTION AND ALTERNATIVES .....	2-1
2.1 Proposed Action and Alternatives for the NARO North LBA Tract .....	2-4
2.1.1 NARO North LBA Tract Proposed Action .....	2-4
2.1.2 NARO North LBA Tract Alternative 1 .....	2-9
2.2 Proposed Action and Alternatives for the NARO South LBA Tract .....	2-9
2.2.1 NARO South LBA Tract Proposed Action .....	2-9
2.2.2 NARO South LBA Tract Alternative 1 .....	2-13
2.2.3 NARO South LBA Tract Alternative 2 .....	2-14
2.2.4 NARO South LBA Tract Alternative 3 .....	2-15
2.3 Proposed Action and Alternatives for the Little Thunder LBA Tract .....	2-16
2.3.1 Little Thunder LBA Tract Proposed Action .....	2-16
2.3.2 Little Thunder LBA Tract Alternative 1 .....	2-21
2.3.3 Little Thunder LBA Tract Alternative 2 .....	2-21
2.3.4 Little Thunder LBA Tract Alternative 3 .....	2-23
2.4 Proposed Action and Alternatives for the West Roundup LBA Tract .....	2-24
2.4.1 West Roundup LBA Tract Proposed Action .....	2-24
2.4.2 West Roundup LBA Tract Alternative 1 .....	2-29
2.4.3 West Roundup LBA Tract Alternative 2 .....	2-29
2.4.4 West Roundup LBA Tract Alternative 3 .....	2-31
2.5 Proposed Action and Alternatives for the West Antelope LBA Tract .....	2-33
2.5.1 West Antelope LBA Tract Proposed Action .....	2-33
2.5.2 West Antelope LBA Tract Alternative 1 .....	2-37
2.5.3 West Antelope LBA Tract Alternative 2 .....	2-38
2.5.4 West Antelope LBA Tract Alternative 3 .....	2-39
2.6 Alternatives Considered but Not Analyzed in Detail .....	2-40
2.6.1 Alternative 4 .....	2-40
2.6.2 Alternative 5 .....	2-41
2.7 Comparison of Alternatives .....	2-43
3.0 AFFECTED ENVIRONMENT .....	3-1

## Table of Contents

---

3.1	General Setting . . . . .	3-1
3.2	Topography and Physiography . . . . .	3-3
3.3	Geology . . . . .	3-3
3.3.1	Mineral Resources . . . . .	3-6
3.4	Soils . . . . .	3-9
3.5	Air Quality and Climate . . . . .	3-10
3.5.1	Topography . . . . .	3-11
3.5.2	Climate and Meteorology . . . . .	3-11
3.5.3	Existing Air Quality . . . . .	3-11
3.5.4	Historical Ambient Air Quality: Particulates . . . . .	3-18
3.5.5	Historical Ambient Air Quality: NO <sub>2</sub> . . . . .	3-24
3.5.6	Air Quality Related Values - Visibility and Acidification of Lakes . . . . .	3-26
3.5.6.1	Visibility . . . . .	3-26
3.5.6.2	Acidification of Lakes . . . . .	3-27
3.5.7	Regulatory Framework . . . . .	3-29
3.6	Water Resources . . . . .	3-31
3.6.1	Groundwater . . . . .	3-31
3.6.2	Surface Water . . . . .	3-34
3.6.3	Water Rights . . . . .	3-36
3.7	Alluvial Valley Floors . . . . .	3-37
3.8	Wetlands . . . . .	3-40
3.9	Vegetation . . . . .	3-41
3.9.1	Threatened, Endangered, Proposed, and Candidate Plant Species and USFS Region 2 Sensitive Species . . . . .	3-42
3.10	Wildlife . . . . .	3-42
3.10.1	Big Game . . . . .	3-45
3.10.2	Other Mammals . . . . .	3-46
3.10.3	Raptors . . . . .	3-47
3.10.4	Game Birds . . . . .	3-48
3.10.5	Migratory Bird Species of Management Concern in Wyoming . . . . .	3-49
3.10.6	Other Species . . . . .	3-49
3.10.7	Threatened, Endangered, Proposed, and Candidate Animal Species and USFS Region 2 Sensitive Species . . . . .	3-51
3.11	Ownership and Use of Land . . . . .	3-51
3.12	Cultural Resources . . . . .	3-69
3.13	Native American Consultation . . . . .	3-72
3.14	Paleontological Resources . . . . .	3-72
3.15	Visual Resources . . . . .	3-74
3.16	Noise . . . . .	3-75
3.17	Transportation Facilities . . . . .	3-75
3.18	Socioeconomics . . . . .	3-77
3.18.1	Population . . . . .	3-77
3.18.2	Local Economy . . . . .	3-77

3.18.3	Employment . . . . .	3-85
3.18.4	Housing . . . . .	3-86
3.18.5	Local Government Facilities and Services . . . . .	3-87
3.18.6	Social Conditions . . . . .	3-87
3.18.7	Environmental Justice . . . . .	3-88
3.19	Hazardous and Solid Waste . . . . .	3-89
4.0	ENVIRONMENTAL CONSEQUENCES . . . . .	4-1
4.1	Direct and Indirect Impacts of Action Alternatives . . . . .	4-5
4.1.1	Topography and Physiography . . . . .	4-5
4.1.2	Geology . . . . .	4-8
4.1.2.1	Mineral Resources . . . . .	4-11
4.1.3	Soils . . . . .	4-15
4.1.4	Air Quality . . . . .	4-17
4.1.4.1	General Information . . . . .	4-17
4.1.4.2	NARO North and South LBA Tracts . . . . .	4-20
4.1.4.3	Little Thunder LBA Tract . . . . .	4-25
4.1.4.4	West Roundup LBA Tract . . . . .	4-30
4.1.4.5	West Antelope LBA Tract . . . . .	4-35
4.1.5	Water Resources . . . . .	4-40
4.1.6	Alluvial Valley Floors . . . . .	4-58
4.1.7	Wetlands . . . . .	4-60
4.1.8	Vegetation . . . . .	4-61
4.1.9	Threatened, Endangered, Proposed, and Candidate Plant Species and USFS Region 2 Sensitive Species . . .	4-63
4.1.10	Wildlife . . . . .	4-63
4.1.11	Threatened, Endangered, Proposed, and Candidate Wildlife Species and USFS Region 2 Sensitive Species . . . . .	4-69
4.1.12	Land Use and Recreation . . . . .	4-69
4.1.13	Cultural Resources . . . . .	4-70
4.1.14	Native American Concerns . . . . .	4-71
4.1.15	Paleontological Resources . . . . .	4-71
4.1.16	Visual Resources . . . . .	4-71
4.1.17	Noise . . . . .	4-72
4.1.18	Transportation Facilities . . . . .	4-73
4.1.19	Socioeconomics . . . . .	4-73
4.1.20	Hazardous and Solid Waste . . . . .	4-77
4.2	No Action Alternative . . . . .	4-77
4.3	Regulatory Compliance, Mitigation, and Monitoring . . . . .	4-79
4.4	Residual Impacts . . . . .	4-84
4.4.1	Topography and Physiography . . . . .	4-84
4.4.2	Geology and Minerals . . . . .	4-85
4.4.3	Soils . . . . .	4-85
4.4.4	Air Quality . . . . .	4-85
4.4.5	Water Resources . . . . .	4-85

4.4.6	Alluvial Valley Floors . . . . .	4-85
4.4.7	Wetlands . . . . .	4-85
4.4.8	Vegetation . . . . .	4-85
4.4.9	Wildlife . . . . .	4-85
4.4.10	Threatened, Endangered, Proposed, and Candidate Species and USFS Region 2 Sensitive Species . . . . .	4-85
4.4.11	Land Use and Recreation . . . . .	4-86
4.4.12	Cultural Resources . . . . .	4-86
4.4.13	Native American Concerns . . . . .	4-86
4.4.14	Paleontological Resources . . . . .	4-86
4.4.15	Visual Resources . . . . .	4-86
4.4.16	Noise . . . . .	4-86
4.4.17	Transportation Facilities . . . . .	4-86
4.4.18	Socioeconomics . . . . .	4-86
4.5	Cumulative Impacts . . . . .	4-86
4.5.1	Topography and Physiography . . . . .	4-94
4.5.2	Geology and Minerals . . . . .	4-95
4.5.3	Soils . . . . .	4-96
4.5.4	Air Quality and Climate . . . . .	4-96
4.5.4.1	Impacts Common to All Alternatives . . . . .	4-99
4.5.4.2	Impacts from Temporary Generation . . . . .	4-104
4.5.4.3	Predicted Air Quality Impacts . . . . .	4-104
4.5.4.3.1	Wyoming PRB Oil and Gas Project EIS Alternatives 1, 2a, and 2b . . . . .	4-105
4.5.4.3.2	Wyoming PRB Oil and Gas Project EIS Alternative 3 . . . . .	4-105
4.5.4.4	Cumulative Impacts . . . . .	4-107
4.5.5	Water Resources . . . . .	4-116
4.5.6	Alluvial Valley Floors . . . . .	4-129
4.5.7	Wetlands . . . . .	4-130
4.5.8	Vegetation . . . . .	4-130
4.5.9	Wildlife . . . . .	4-131
4.5.10	Threatened, Endangered, Proposed, and Candidate Species and USFS Region 2 Sensitive Species . . . . .	4-135
4.5.11	Land Use and Recreation . . . . .	4-135
4.5.12	Cultural Resources . . . . .	4-137
4.5.13	Native American Concerns . . . . .	4-138
4.5.14	Paleontological Resources . . . . .	4-138
4.5.15	Visual Resources . . . . .	4-138
4.5.16	Noise . . . . .	4-138
4.5.17	Transportation Facilities . . . . .	4-139
4.5.18	Socioeconomics . . . . .	4-139
4.6	The Relationship Between Local Short-term Uses of Man*s Environment and the Maintenance and Enhancement of Long-term Productivity . . . . .	4-142
4.7	Irreversible and Irretrievable Commitments of Resources . . . . .	4-144

5.0	CONSULTATION AND COORDINATION . . . . .	5-1
6.0	REFERENCES CITED . . . . .	6-1
7.0	GLOSSARY . . . . .	7-1
8.0	INDEX . . . . .	8-1

## LIST OF FIGURES

Figure ES-1.	General Location Map with Federal Coal Leases and LBA Tracts . . . . .	ES-2
Figure ES-2.	NARO North and NARO South LBA Alternative Tract Configurations . . . . .	ES-6
Figure ES-3.	Little Thunder LBA Alternative Tract Configurations . . . . .	ES-7
Figure ES-4.	West Roundup LBA Alternative Tract Configurations . . . . .	ES-8
Figure ES-5.	West Antelope LBA Alternative Tract Configurations . . . . .	ES-9
Figure ES-6.	General Analysis Area . . . . .	ES-14
Figure ES-7.	Maximum Modeled PM <sub>10</sub> Concentrations at the North Antelope/Rochelle Complex Ambient Air Boundary for the Year 2006 . . . . .	ES-17
Figure ES-8.	Maximum Modeled PM <sub>10</sub> Concentrations at the Black Thunder Mine Ambient Air Boundary for the Year 2026 . . . . .	ES-18
Figure ES-9.	Maximum Modeled PM <sub>10</sub> Concentrations at the North Rochelle Mine Ambient Air Boundary for the Year 2012 . . . . .	ES-19
Figure ES-10.	Maximum Modeled PM <sub>10</sub> Concentrations at the Antelope Mine Ambient Air Boundary for the Year 2016 . . . . .	ES-20
Figure ES-11.	Extrapolated Worst-Case Wyodak Coal Aquifer Drawdown Scenarios Showing Extent of Actual 20-Year Drawdowns and USGS Modeled Cumulative Drawdowns . . . . .	ES-32
Figure 1-1.	General Location Map with Federal Coal Leases and LBA Tracts . . . . .	1-2
Figure 1-2.	North Antelope/Rochelle Complex Federal Coal Leases and NARO North and NARO South LBA Tracts as Applied for . . . . .	1-8
Figure 1-3.	Black Thunder Mine Federal Coal Leases and Little Thunder LBA Tract as Applied for . . . . .	1-10
Figure 1-4.	North Rochelle Mine Federal Coal Leases and West Roundup LBA Tract as Applied for . . . . .	1-12
Figure 1-5.	Antelope Mine Federal Coal Leases and West Antelope LBA Tract as Applied for . . . . .	1-13
Figure 2-1.	NARO North and NARO South LBA Alternative Tract Configurations . . . . .	2-6

## Table of Contents

---

Figure 2-2.	Little Thunder LBA Alternative Tract Configurations . . . . .	2-17
Figure 2-3.	West Roundup LBA Alternative Tract Configurations . . . . .	2-25
Figure 2-4.	West Antelope LBA Alternative Tract Configurations . . . . .	2-34
Figure 3-1.	General Analysis Area . . . . .	3-2
Figure 3-2.	Stratigraphic Relationships and Hydrologic Characteristics of Upper Cretaceous, Lower Tertiary, and Recent Geologic Units, PRB, Wyoming . . . . .	3-4
Figure 3-3.	Wind Rose, Air Quality and Meteorological Stations at the North Antelope/Rochelle Complex . . . . .	3-12
Figure 3-4.	Wind Rose, Air Quality and Meteorological Stations at the Black Thunder Mine . . . . .	3-13
Figure 3-5.	Wind Rose, Air Quality and Meteorological Stations at the North Rochelle Mine . . . . .	3-14
Figure 3-6.	Wind Rose, Air Quality and Meteorological Stations at the Antelope Mine . . . . .	3-15
Figure 3-7.	Active PM <sub>10</sub> Monitoring Stations in Northeastern Wyoming . . . . .	3-16
Figure 3-8.	Cumulative Coal Production and Overburden Removal vs. Ambient Particulates for the SPRB General Analysis Area (1995 through 2000) . . . . .	3-23
Figure 3-9.	Visibility in the Badlands and Bridger Wilderness Areas . .	3-28
Figure 3-10.	Surface Drainage in the General Analysis Area . . . . .	3-35
Figure 3-11.	Surface Ownership Within the NARO North and NARO South LBA Tracts . . . . .	3-52
Figure 3-12.	Surface Ownership Within the Little Thunder LBA Tract . .	3-53
Figure 3-13.	Surface Ownership Within the West Roundup LBA Tract . .	3-54
Figure 3-14.	Surface Ownership Within the West Antelope LBA Tract . .	3-55
Figure 3-15.	Oil and Gas Ownership on the NARO North and NARO South LBA Tracts . . . . .	3-56
Figure 3-16.	Oil and Gas Ownership on the Little Thunder LBA Tract . .	3-57
Figure 3-17.	Oil and Gas Ownership on the West Roundup LBA Tract . .	3-58
Figure 3-18.	Oil and Gas Ownership on the West Antelope LBA Tract . .	3-59
Figure 3-19.	Relationship Between A-Scale Decibel Readings and Sounds of Daily Life . . . . .	3-76
Figure 3-20.	Transportation Facilities Within and Adjacent to the NARO North and NARO South LBA Tracts . . . . .	3-78
Figure 3-21.	Transportation Facilities Within and Adjacent to the Little Thunder LBA Tract . . . . .	3-79
Figure 3-22.	Transportation Facilities Within and Adjacent to the West Roundup LBA Tract . . . . .	3-80
Figure 3-23.	Transportation Facilities Within and Adjacent to the West Antelope LBA Tract . . . . .	3-81
Figure 3-24.	Estimated Wyoming and Federal Revenues from 2000 Coal Production in Campbell and Converse Counties . . . . .	3-84

Figure 4-1.	Maximum Modeled PM <sub>10</sub> Concentrations at the North Antelope/Rochelle Complex Ambient Air Boundary for the Year 2001 . . . . .	4-22
Figure 4-2.	Maximum Modeled PM <sub>10</sub> Concentrations at the North Antelope/Rochelle Complex Ambient Air Boundary for the Year 2006 . . . . .	4-23
Figure 4-3.	Maximum Modeled PM <sub>10</sub> Concentrations at the Black Thunder Mine Ambient Air Boundary for the Year 2002 . .	4-26
Figure 4-4.	Maximum Modeled PM <sub>10</sub> Concentrations at the Black Thunder Mine Ambient Air Boundary for the Year 2026 . .	4-27
Figure 4-5.	Maximum Modeled PM <sub>10</sub> Concentrations at the North Rochelle Mine Ambient Air Boundary for the Year 2002 . .	4-32
Figure 4-6.	Maximum Modeled PM <sub>10</sub> Concentrations at the North Rochelle Mine Ambient Air Boundary for the Year 2012 . .	4-33
Figure 4-7.	Maximum Modeled PM <sub>10</sub> Concentrations at the Antelope Mine Ambient Air Boundary for the Year 2006 . . . . .	4-37
Figure 4-8.	Maximum Modeled PM <sub>10</sub> Concentrations at the Antelope Mine Ambient Air Boundary for the Year 2016 . . . . .	4-38
Figure 4-9.	North Antelope/Rochelle Complex Life of Mine Drawdown Map, Resulting from Proposed Action . . . . .	4-45
Figure 4-10.	Black Thunder Mine Life of Mine Drawdown Map, Resulting from Proposed Action . . . . .	4-49
Figure 4-11.	North Rochelle Mine Life of Mine Drawdown Map, Resulting from Proposed Action . . . . .	4-52
Figure 4-12.	Antelope Mine Life of Mine Drawdown Map, Resulting from Proposed Action . . . . .	4-56
Figure 4-13.	Estimated Wyoming and Federal Revenues from the Leasing and Subsequent Mining of the NARO North, NARO South, Little Thunder, West Roundup, and West Antelope LBA Tracts . . . . .	4-76
Figure 4-14.	Extrapolated Worst-Case Wyodak Coal Aquifer Drawdown Scenarios Showing Extent of Actual 20-Year Drawdowns and USGS Modeled Cumulative Drawdowns . . . . .	4-122
Figure 4-15.	Cumulative Worst-Case Coal Aquifer Drawdown for the Five Southern Mines with Maximum Modeled Drawdown Contours From PRB Oil and Gas Project DEIS Superimposed . . . . .	4-128

### LIST OF TABLES

Table ES-1.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for NARO North and NARO South LBA Tracts and North Antelope/Rochelle Complex . . . . .	ES-10
-------------	--	-------



## Table of Contents

---

Table ES-2.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for Little Thunder LBA Tract and Black Thunder Mine . . . . .	ES-11
Table ES-3.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for West Roundup LBA Tract and North Rochelle Mine . . . . .	ES-12
Table ES-4.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for West Antelope LBA Tract and Antelope Mine . . . . .	ES-13
Table 1-1.	Leases Issued Since Decertification, Powder River Basin, Wyoming . . . . .	1-5
Table 1-2.	Pending LBAs, Powder River Basin, Wyoming. . . . .	1-6
Table 2-1.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for NARO North and NARO South LBA Tracts and North Antelope/Rochelle Complex . . . . .	2-44
Table 2-2.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for Little Thunder LBA Tract and Black Thunder Mine . . . . .	2-45
Table 2-3.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for West Roundup LBA Tract and North Rochelle Mine . . . . .	2-46
Table 2-4.	Summary Comparison of Coal Production, Surface Disturbance, and Mine Life for West Antelope LBA Tract and Antelope Mine . . . . .	2-47
Table 2-5.	Summary Comparison of Magnitude and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative 2, Alternative 3, and the No Action Alternative for the NARO North, NARO South, Little Thunder, West Roundup, and West Antelope LBA Tracts . . . . .	2-48
Table 2-6.	Summary Comparison of Magnitude and Duration of Cumulated Impacts . . . . .	2-55
Table 3-1.	Assumed Background Air Pollutant Concentrations, Applicable Ambient Air Quality Standards, and PSD Increment Values (in $\mu\text{g}/\text{m}^3$ ) . . . . .	3-19
Table 3-2.	Summary of WDEQ/AQD Reports on Air Quality Monitoring in Wyoming's Powder River Basin, 1980-2000 . . . . .	3-21
Table 3-3.	Annual Ambient $\text{NO}_2$ Concentration Data . . . . .	3-25
Table 3-4.	2001 Annual Ambient $\text{NO}_2$ Concentration Data . . . . .	3-25
Table 3-5.	Approximate Distances and Directions from the General Analysis Area to PSD Class I and Class II Sensitive Receptor Areas . . . . .	3-27
Table 3-6.	Existing Acid Neutralizing Capacity in Sensitive Lakes . . . . .	3-29
Table 3-7.	Dominant Vegetation Types in the General Analysis Area . . . . .	3-43

Table 3-8.	40 Migratory Bird Species of Management Concern in Wyoming for Coal Mines: Their Regional Status, and Expected, and Actual Occurrence on or Near the SPRB Coal LBA Tracts . . . . .	3-50
Table 3-9.	Distribution of Surface Ownership Within Each LBA Tract and Study Area . . . . .	3-51
Table 3-10.	NARO North and South LBA Tracts Oil and Gas Ownership . . . . .	3-60
Table 3-11.	Little Thunder LBA Tract Oil and Gas Ownership . . . . .	3-62
Table 3-12.	West Roundup LBA Tract Oil and Gas Ownership . . . . .	3-63
Table 3-13.	West Antelope LBA Tract Oil and Gas Ownership . . . . .	3-64
Table 3-14.	Estimated 2001 Fiscal Revenues from 2000 Coal Production in Campbell and Converse Counties . . . . .	3-82
Table 4-1.	Comparison of Existing and Proposed North Antelope/Rochelle Complex Disturbance Area and Mining Operations . . . . .	4-2
Table 4-2.	Comparison of Existing and Proposed Black Thunder Mine Disturbance Area and Mining Operations . . . . .	4-3
Table 4-3.	Comparison of Existing and Proposed North Rochelle Mine Disturbance Area and Mining Operations . . . . .	4-4
Table 4-4.	Comparison of Existing and Proposed Antelope Mine Disturbance Area and Mining Operations . . . . .	4-4
Table 4-5.	Average Overburden, Interburden, and Coal Thicknesses and Approximate Postmining Surface Elevation Changes of the Five LBA Tracts . . . . .	4-7
Table 4-6.	Average Overburden, Interburden, and Coal Thicknesses for the Applicant Mines' Existing Permit Areas . . . . .	4-9
Table 4-7.	Water Supply Wells Possibly Subject to Drawdown if NARO North and South LBA Tracts are Mined . . . . .	4-46
Table 4-8.	Water Supply Wells Possibly Subject to Drawdown if Little Thunder LBA Tract is Mined . . . . .	4-50
Table 4-9.	Water Supply Wells Possibly Subject to Drawdown if West Roundup LBA Tract is Mined . . . . .	4-54
Table 4-10.	Water Supply Wells Possibly Subject to Drawdown if West Antelope LBA Tract is Mined . . . . .	4-58
Table 4-11.	Maximum Wetland Impacts in the NARO North and South, Little Thunder, West Roundup, and West Antelope LBA Tracts . . . . .	4-60
Table 4-12.	Projected Socioeconomic Impacts from Leasing the NARO North and South LBA Tracts under the Proposed Action or Action Alternatives . . . . .	4-74
Table 4-13.	Projected Socioeconomic Impacts from Leasing the Little Thunder LBA Tract under the Proposed Action or Action Alternatives . . . . .	4-75
Table 4-14.	Projected Socioeconomic Impacts from Leasing the West Roundup LBA Tract under the Proposed Action or Action	

	Alternatives . . . . .	4-75
Table 4-15.	Projected Socioeconomic Impacts from Leasing the West Antelope LBA Tract under the Proposed Action or Action Alternatives . . . . .	4-75
Table 4-16.	Regulatory Compliance, Mitigation and Monitoring Measures required under each Proposed Action, Alternative 1 (No Action), Alternative 2, or Alternative 3 . . . . .	4-80
Table 4-17.	Status of Wyoming PRB Coal Mines . . . . .	4-88
Table 4-18.	Coal Production and Development Levels, Campbell and Converse Counties, Wyoming . . . . .	4-89
Table 4-19.	Emission Factors for Temporary Generation for Oil and Gas Pipeline Compressors . . . . .	4-104
Table 4-20.	Near-Field Concentrations from a Single Temporary Generator for Oil and Gas Pipeline Compressors . . . . .	4-105
Table 4-21.	Range of Predicted Maximum Potential Near-Field Impacts under Alternatives 1, 2A, and 2B of the Wyoming PRB Oil and Gas Project EIS (with Montana Alternative E) . . . . .	4-106
Table 4-22.	Predicted Maximum Potential Near-Field Impacts under Alternative 3 of the Wyoming PRB Oil and Gas Project EIS (with Montana Alternative E) . . . . .	4-108
Table 4-23.	Maximum Predicted PSD Class I Area Cumulative Far-Field Impacts (in $\mu\text{g}/\text{m}^3$ ) under Wyoming PRB Oil and Gas Project EIS Alternative 1 (Proposed Action) and all South PRB Coal EIS Alternatives . . . . .	4-109
Table 4-24.	Predicted Total Cumulative Change in Acid Neutralizing Capacity at Sensitive Area Lakes (percent change) . . . . .	4-111
Table 4-25.	Predicted Visibility Impacts in the Mandatory Federal PSD Class I Washakie Wilderness Area from Direct Wyoming PRB Oil and Gas Project EIS Alternative Sources - Daily FLAG Refined Method (Average Number of Days per Year Predicted to Equal or Exceed a 1.0 dv "Just Noticeable Change") . . . . .	4-113
Table 4-26.	Predicted Visibility Impacts in Class I Areas - Daily FLAG Refined Method . . . . .	4-114
Table 5-1.	Other Federal, State, and Local Governmental Agencies Consulted in EIS Preparation. . . . .	5-3
Table 5-2.	List of Contributors and Reviewers . . . . .	5-4
Table 5-3.	List of Preparers . . . . .	5-5
Table 5-4a.	BLM Distribution List for Coal Leasing . . . . .	5-7
Table 5-4b.	Distribution List for SPRB Coal Draft EIS . . . . .	5-10

## LIST OF APPENDICES

Appendix A.	Federal and State Permitting Requirements and Agencies
Appendix B.	Unsuitability Criteria for the NARO North, NARO South, Little

	Thunder, West Roundup, and West Antelope LBA Tracts
Appendix C.	Coal Lease-by-Application Flow Chart
Appendix D.	Bureau of Land Management Special Coal Lease Stipulations, U.S. Forest Service Special Stipulations, and Form 3400-12 Coal Lease
Appendix E.	Air Quality Impact Technical Support Document
Appendix F.	Non-Mine Groundwater and Surface Water Rights Within and Adjacent to the NARO North, NARO South, Little Thunder, West Roundup, and West Antelope LBA Tracts
Appendix G.	Threatened, Endangered, Proposed, and Candidate Species USFS Region 2 Sensitive Species and Management Indicator Species BLM Sensitive Species
Appendix H.	CBM Wells Capable of Production on or in Sections Adjacent to the NARO North, NARO South, Little Thunder, West Roundup, and West Antelope LBA Tracts

---

**Abbreviations and Acronyms Used in this Report**

---

ACC	Antelope Coal Company
ALC	Ark Land Company
ANC	acidification neutralization capacity
ac-ft	acre-foot, acre-feet
ac-ft/yr	acre-foot per year, acre-feet per year
AML	Abandoned Mine Land
AQRV	air quality related values
ARCO	Atlantic Richfield Company
AREV	SEO water rights database and program
AVF	alluvial valley floor
BACT	best available control technology
bcy	bank cubic yards
BLM	Bureau of Land Management
BN-UP, BN&UP	Burlington Northern-Union Pacific
B.P.	before present
Btu	British thermal units
Btu/lb	British thermal units per pound
CAA	Clean Air Act
CBM	coal bed methane
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHIA	Cumulative Hydrologic Impact Assessment
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
CREG	Consensus Revenue Estimating Group
cy	cubic yards
dBA	A-weighted decibels
DEIS	Draft Environmental Impact Statement
DM&E	Dakota, Minnesota & Eastern Railroad Corporation
DOI	Department of the Interior
dv	deciview, a measure of view impairment
EA	Environmental Assessment
EC	elemental carbon particles (re: air quality)
EIS	Environmental Impact Statement
ENCOAL	Encoal Corporation
EPA	Environmental Protection Agency
F	Fahrenheit
FCLAA	Federal Coal Leasing Act Amendments of 1976
FDM	Fugitive Dust Model
FEA	Final Environmental Assessment
FEIS	Final Environmental Impact Statement
FLM	Federal Land Management
FLPMA	Federal Land Policy Management Act of 1976
FR	Federal Register
ft	feet, foot
ft/day	feet per day
ft/mile	feet per mile

**Abbreviations and Acronyms Used in this Report**

---

g	gram
GAGMO	Gillette Area Ground Water Monitoring Organization
GDP	Gross Domestic Product
gpm	gallons per minute
GSP	Gross State Product
HAP	Hazardous Air Pollutant
hp	horsepower
hr	hour
IBLA	Interior Board of Land Appeals
IMPROVE	Interagency Monitoring of Protected Environments
IWAQM	Interagency Workgroup on Air Quality Monitoring
JRCC	Jacobs Ranch Coal Company
Km	kilometers
KMCC	Kerr-McGee Coal Corporation
Kv	kilovolts
LAC	limits of acceptable change (re: air quality)
LBA	lease by application
lbs/mmBtu	pounds per million British thermal units
LFC	Liquids From Coal
LOP	Life of Project
LRMP	Land and Resource Management Plan
LW	Lower Wyodak coal seam
MBHFI	migratory birds of high federal interest
µeq/L	microequivalents per liter
µg/m <sup>3</sup>	micrograms per cubic meter
µmhos/cm	micromhos per centimeter
MCF	thousand cubic feet
MEI	maximally exposed individual
mg/L	milligrams per liter
MLA	Mineral Leasing Act of 1920
MLE	most likely exposure
mm	million
mmbcy	million bank cubic yards
mmt	million tons
mmtpy	million tons per year
mph	miles per hour
MW	Middle Wyodak coal seam
Mw	megawatts
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAPG	North American Power Group
NEPA	National Environmental Policy Act of 1969
NO	nitrogen oxide
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	nitrogen oxides
NPS	National Park Service
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory

---

**Abbreviations and Acronyms Used in this Report**

---

O <sub>3</sub>	photochemical oxidants
OC	organic carbon particles
OSM	Office of Surface Mining Reclamation & Enforcement
PECS	passive enclosure control systems
P.M.	Prime Meridian
PM <sub>2.5</sub>	particulates finer than 2.5 microns in effective diameter
PM <sub>10</sub>	particulates finer than 10 microns in effective diameter
PMT	postmining topography
PP&L	Pacific Power and Light Company
PRB	Powder River Basin
PRBRC	Powder River Basin Resource Council
PRCC	Powder River Coal Company
PRRCT	Powder River Regional Coal Team
PSD	prevention of significant deterioration
R2P2	Resource Recovery and Protection Plan
RH	relative humidity
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-Way
SARA	Superfund Amendment & Reauthorization Act of 1986
SEO	State Engineer's Office
scf/ton	standard cubic feet per ton
SHPO	State Historic Preservation Office
SLAMS	State and Local Air Monitoring Stations
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO <sub>2</sub>	sulfur dioxide
SPRB	South Powder River Basin
T&E	threatened and endangered
TBCC	Thunder Basin Coal Company, LLC
TBNG	Thunder Basin National Grassland
TCC	Triton Coal Company, LLC
TDS	total dissolved solids
TSP	total suspended particulates
U.S.	United States
USC, U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UW	Upper Wyodak coal seam
VMT	vehicle miles traveled
VOCs	volatile organic compounds
VRM	visual resource management
WAAQS	Wyoming Ambient Air Quality Standards
WARMS	Wyoming Air Resources Monitoring System
WCIC	Wyoming Coal Information Committee
WDEQ	Wyoming Department of Environmental Quality
WDEQ/AQD	Wyoming Department of Environmental Quality/Air Quality Division

**Abbreviations and Acronyms Used in this Report**

---

WDEQ/LQD	Wyoming Department of Environmental Quality/Land Quality Division
WGFD	Wyoming Game and Fish Department
WMA	Wyoming Mining Association
WOC	Wyoming Outdoor Council
WOGCC	Wyoming Oil and Gas Conservation Commission
WSBLC	Wyoming State Board of Land Commissioners
WSGS	Wyoming State Geological Survey
WSO-RMG	Wyoming State Office Reservoir Management Group